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**APPENDIX L**

**DESIGNATION OF FOCAL VERTEBRATE SPECIES FOR THE  
LAKE TAHOE BASIN**

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## DESIGNATION OF FOCAL VERTEBRATE SPECIES FOR THE LAKE TAHOE BASIN

Patricia N. Manley and Matthew D. Schlesinger

### **Candidates for Focal Species Status**

Only species presumed to have established populations in the basin and those considered extirpated or potentially extirpated were considered as candidates for focal species status. The criteria used for determining candidate species differed among vertebrate groups based on the source of the data. The specific criteria used to identify candidate focal species are described below for each vertebrate group.

### ***Birds***

We omitted all birds listed as “accidental” on the Lake Tahoe basin bird list (Eastern Sierra Interpretive Association ca. 1993); further, we omitted any bird species considered no more common than “rare” in any season, unless that species was detected at more than one site by Manley and Schlesinger (in prep). We included species that were not included in Eastern Sierra Interpretive Association (ca. 1993) only if they were detected at more than one site by Manley and Schlesinger (in prep). We omitted two additional species, the Horned Grebe and Semipalmated Plover; both species are listed in Eastern Sierra Interpretive Association (ca. 1993) as “occasional” in one or more seasons but have not been recorded recently and are not included in the Sierra All Species Information (SASI) database (USDA 1999b). We recognize the limitations of using abundance categories not based on systematic sampling. However, no such studies have occurred here in the basin. Therefore, we used the classifications in Eastern Sierra Interpretive Association (ca. 1993) to

approximate the relative abundance of bird species. The following extirpated and potentially extirpated species were candidates for focal species status: Peregrine Falcon, Savannah Sparrow, Lewis’s Woodpecker, and Canyon Wren.

### ***Mammals***

We included species from Orr (1949), Manley and Schlesinger (in prep.), Tatum (1998a, 1998b), and Pierson (1998), as these sources provided the only verified recent sightings of mammals in the basin. The following extirpated and potentially extirpated species were candidates for focal species status: Mountain sheep, heather vole, canyon mouse, white-tailed hare, wolverine, Sierra Nevada red fox, and grizzly bear.

### ***Amphibians and Reptiles***

We included species detected by Keane and Morrison (1994) and Manley and Schlesinger (in prep), as these studies provided the only verified recent sightings of herpetofauna in the basin. The northern leopard frog, which has apparently been extirpated from the basin, was also a candidate for focal species status.

### ***Fish***

We included all fish species from the list of current species because all of these species are suspected to have self-supporting populations in the basin. Four extirpated species, Arctic grayling, Atlantic salmon, chinook salmon, and lake whitefish were not considered candidates because they were introduced to the basin (Cordone 1986).

### Vulnerability Analysis Using the Sierra All Species Information Database

The Sierran All Species Information (SASI) database (USDA 1999b) was developed for the Sierra Nevada Monitoring Strategy as a tool to facilitate a vulnerability analysis for Sierra Nevada vertebrates (Keane and Zielinski in prep). The database represents a combination of fields populated from the literature and fields populated from questionnaires distributed to individuals with expertise on particular Sierran taxa. We used the following variables populated from the literature: AQUATIC, HABSPECALLACT, LSOGDEP, MOBILITY, and RNGSIZE (Table L-1). We used the following variables populated from questionnaires: POPSIZE, POPTREND, and RNGCHG (Table L-1). For questionnaire-derived variables, each major taxonomic group (birds, mammals, and reptiles/amphibians) was addressed by an expert on Sierran species and all responses were reviewed by the authors of the database. The following variable descriptions are adapted from USDA (1999b); information not relevant to species in our analyses has been omitted.

**AQUATIC (Aquatic Association)** - Describes species association with aquatic habitat.

- (1) Terrestrial
- (2) Semi-aquatic
- (3) Aquatic

*Assigning Aquatic status: Processes and Assumptions*

1. All data were derived from the CWHR species notes (Zeiner et al. 1988, Zeiner et al. 1990a, Zeiner et al. 1990b).
2. If a species' entire life cycle required being in or on water, and if their prey base consisted solely of aquatic species, they were considered aquatic. Bird species that are shore nesters were still considered aquatic if they nested within 60 m of a body of water. Species were semi-aquatic if only part of their life cycle required water and/or their prey base consisted of both terrestrial and aquatic species.

3. If the CWHR species notes for herpetofauna stated that eggs are deposited in water, larvae are aquatic and adults are terrestrial, these species were given a semi-aquatic status.

4. If the CWHR species notes for herpetofauna stated that eggs are deposited in water, larvae may transform into terrestrial adults or may remain as neotenic adults, these species were given a semi-aquatic status.

**HABSPECALLACT (Habitat Specificity [Liberal])** - Proportion of CWHR vegetation type-structural/canopy cover classes (Mayer and Laudenslayer 1988) ranked with a low, medium, or high index value relative to the total number of classes possible in the Sierra Nevada for a species.

- (1) Very habitat specific (High vulnerability)
- (2) Moderately habitat specific (Moderate vulnerability)
- (3) Habitat generalist (Low vulnerability)

*Assigning Habitat Specificity (Liberal): Process and Assumptions*

1. All values were calculated from the CWHR database (CDFG 1998a). This database contains feeding, reproductive, and cover habitat suitability values (H=high, M=moderate, L=low, null=not present/applicable), as well as an index value (the highest value of feeding, reproductive, and cover), for each seral stage of each habitat a species occurs in. Within the study area, there are 49 CWHR habitat types, each containing from 7 to 18 seral stages, for a total of 563 possible habitat type/seral stage combinations.
2. The frequency distribution of the habitat specificity values for species in the basin was examined for the two most conspicuous breaks. Species with values ranging from 0-0.3 were categorized as 'very habitat specific', those ranging from 0.3-0.6 were 'moderately habitat specific', and 0.6-1 were 'habitat generalists.'

**Table L-1**—Variables from the Sierran All Species Information (SASI) database (USDA 1999b) used in focal species analyses. CWHR information was obtained from CDFG (1998a).

Variable Name	Description	Scores	Definitions of Scores
AQUATIC	Aquatic association	1	Terrestrial
		2	Semi-aquatic
		3	Aquatic
HABSPECALL	Habitat specificity (discrete)	1	Habitat generalist (proportion of CWHR seral stages used 0.6 - 1.0)
		2	Moderately habitat specific (proportion of CWHR seral stages used 0.3 - 0.6)
		3	Very habitat specific (proportion of CWHR seral stages used 0.0 - 0.3)
HABSPECALLACT	Habitat specificity (continuous)	0-1	Proportion of CWHR seral stages used
LSOGDEP	Late-seral old growth association	1	Indicates that species population in the Sierra Nevada requires LSOG habitat
		2	Indicates that species uses LSOG habitat but is not dependent upon it
		3	Indicates that species does not use LSOG habitat significantly
MOBILITY	Mobility/dispersal capability	1	Flier
		2	High-mobility non-flier
		3	Low-mobility non-flier
POPSIZE	Sierra Nevada population size	1	Species has not been reported for a number of years but may still exist
		2	1-100 adults
		3	101-1,000 adults, or population size is unknown but suspected to be small
		4	1,001-10,000 adults
		5	>10,000 adults, or population size is unknown but suspected to be large
POPTREND	Sierra Nevada population trend	1	Population size known to be decreasing
		2	Trend unknown but population size suspected to be decreasing
		3	Population formerly experienced serious declines but is presently stable
		4	Population size stable or suspected to be stable or increasing
		5	Population size known to be increasing
RNGCHG	Sierra Nevada range change	1	Area occupied suspected to have declined by 90-100%
		2	Area occupied suspected to have declined by 50-89%
		3	Area occupied unknown but suspected to have declined by $\geq 50\%$
		4	Area occupied suspected to have declined by 1-49%
		5	Area occupied unknown but suspected to have declined by $\leq 50\%$
		6	Area occupied suspected to be stable or has increased
RNGSIZE	Home range size	1	Small (1 - 1000 m <sup>2</sup> )
		2	Medium (1,001 - 400,000 m <sup>2</sup> )
		3	Large (> 400,000 m <sup>2</sup> )

**LSOGDEP (Late Seral/Old Growth Association)** - Describes species' dependency on late seral/old growth (LSOG) habitat in the Sierra Nevada based on SNEP classification (Graber 1996). Two species' classifications were changed by the database authors from category 2 or 3 to category 1: the Red Crossbill and the marten.

- (1) Indicates that species population in the Sierra Nevada requires LSOG habitat.
- (2) Indicates that species uses LSOG habitat but is not dependent upon it.
- (3) Indicates that species does not use LSOG habitat significantly.

**MOBILITY (Mobility/Dispersal Capability)** - Defines the relative ability of a taxon to move in response to daily and seasonal needs, reproductive needs, and/or in response to habitat disturbance.

- (1) Low-mobility non-fliers (High vulnerability)
- (2) High-mobility non-fliers (Moderate vulnerability)
- (3) Flier (Low vulnerability)

*Assigning Mobility/Dispersal Capability status: Process and Assumptions*

1. All data were derived by terrestrial species team consensus.
2. All amphibians, reptiles, and mammals in the orders Insectivora, Lagomorpha, and Rodentia (with the exception of *Castor canadensis*, due to its ability to relocate between watersheds) were considered 'low mobility non-fliers' based largely because as herbivores or insectivores their foods do not require extensive mobility to locate.
3. All other mammals (with the exception of bats) were considered 'high mobility non-fliers' due to either their carnivorous diets or high mobility characteristics.
4. 'Flier' status was given to all birds and bats.

**POPSIZE (Sierra Nevada Population Size)** - The estimated number of adults of the species throughout the Sierra Nevada.

- (1) Species has not been reported for a number of years but may still exist (High imperilment)
- (2) 1-100 individuals (High imperilment)
- (3) 101-1,000 individuals, or population size is unknown but suspected to be small (Moderate imperilment)
- (4) 1,001-10,000 individuals (Low imperilment)
- (5) >10,000 individuals, or population size is unknown but suspected to be large (Low imperilment)

**POPTREND (Sierra Nevada Population Trend)** - Overall trend in the number of individuals of the species throughout the Sierra Nevada since 1900, or later depending on the date of the earliest information for the species.

- (1) Population size known to be decreasing (High imperilment)
- (2) Trend unknown but population size suspected to be decreasing (Moderate imperilment)
- (3) Population formerly experienced serious declines but is presently stable (Moderate imperilment)
- (4) Population size stable or suspected to be stable or increasing (Low imperilment)
- (5) Population size known to be increasing (Low imperilment)

**RNGCHG (Sierra Nevada Range Change)** - Percent change in the area occupied by the species since historic times. This is an estimate of change in the proportion of the total range that is occupied or utilized; it may or may not equal the change in total range. For example, a species may still be found throughout its historic range yet within that range it may currently occupy only 50% of the area historically occupied.

- (1) Area occupied suspected to have declined by 90-100% (High imperilment)
- (2) Area occupied suspected to have declined by 50-89% (High imperilment)
- (3) Area occupied unknown but suspected to have declined by >50% (High imperilment)
- (4) Area occupied suspected to have declined by 1-49% (Moderate imperilment)
- (5) Area occupied unknown but suspected to have declined by <50% (Moderate imperilment)
- (6) Area occupied suspected to be stable or has increased (Low imperilment)

**RNGSIZE (Home Range Size)** - Describes home range size of species in 3 categories.

- (1) Small (Low vulnerability)
- (2) Medium (Moderate vulnerability)
- (3) Large (High vulnerability)

*Assigning Home Range classes: Process and Assumptions*

1. All data were derived from the CWHR species notes, with the exception of *Martes americana* and *M. pennanti* (Ruggiero et al. 1994), and *Ursus arctos* (Pasitschniak-Arts 1993).
2. Amphibians, reptiles, mammals and birds were included in the same database and subjected to the same analyses.
3. Home ranges given as linear measurements (in the cases of many amphibians) were converted to areas by assuming the linear distances were the diameters of circles.
4. If no data were available for home range, then values listed under 'territory' were used. This was done for birds and, to a lesser extent, mammals, and was infrequent.
5. If home range was given for many states, values from California were used, regardless if these values were not the maximum or minimum stated values. This occurred only a few times.
6. More than one value for home range was often provided. In these cases a column was created for the maximum value and one for the minimum value. Thus, the database authors were prepared to conduct analyses on each set of numbers if necessary.

7. When the CWHR species notes reported a home range of "several hectares" or "several meters", the authors assigned a value of 3. This occurred on only a few occasions.
8. Densities of group living/social species were presented as per capita.

*Classification:*

1. Each species was designated as having a "small," "medium," or "large" home range on the basis of the following method. The authors created bins (ranges) to examine the frequency distribution of home range values for all species for which they were reported (about 50% of the herps, 64% of the mammals, and 82% of the birds). The authors did this twice: once using the "maximum and only" column (uses either the max value or the only value provided for the species) and once using the "minimum and only" column. These distributions were examined for natural breaks and selected the column that had the most conspicuous breaks. The authors then took these columns and combined all taxa, and repeated the above step to examine the frequency distribution. Species with home ranges from 1 - 1000 m<sup>2</sup> were classified as "small", those with ranges from 1,001 - 400,000 m<sup>2</sup> were "moderate", and those greater than 400,000 m<sup>2</sup> were considered "large".
2. Species for which no home range data were provided (n = 126) were not included in the analyses described above. Further literature review produced no additional data, necessitating the use of the following criteria to classify those 'unknown' species:
  - a) If an unknown species had one or more congenics in the database that were all assigned to a single home range class, the unknown species was assigned the same class as its congenics.
  - b) If an unknown species had congenics in the database assigned to more than one home range class, the species was placed with the majority class and/or with the class for which the body sizes were most similar.
  - c) If the only congenics in the CWHR species notes with home range data occurred outside the Sierra Nevada, and they had similar body size, these data were

used to assign the unknown species to a home range class.

d) Species for which there were no congenics in California were considered on a family level. If confamilials occurred either in the database or the CWHR species notes and were of similar body size, these data were used to classify an unknown species.

e) For herpetofauna, particularly the reptiles, text within the home range section of the CWHR species notes was used to classify unknown species. Statements such as “probably small” and “probably sedentary” resulted in a “small” classification. Statements such as “possible to see several individuals in a hectare” resulted in a “moderate” classification.

f) Sixteen of the 30 snake species met none of the criteria mentioned above. Using the 14 species that the authors could classify, a mean was generated for the body size (cm) of species within each home range class (small=65.74; moderate=108.17; large=140.83). The authors assumed a positive relationship between body size and home range class and assigned the 16 species to a home range class according to which mean their body sizes were nearest.